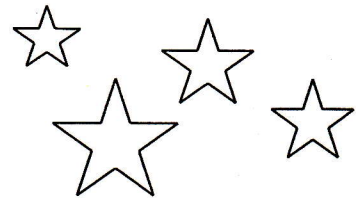
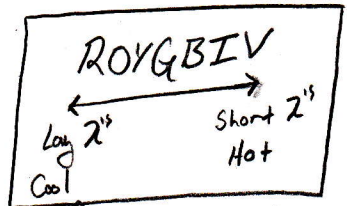


## Note Outline 25.1 – Properties of Stars



### I. Surface Temperature and Color

- Temperature determines a star's color.
- Hotter stars - higher energy - shorter  $\lambda$ 's - bluer color
- Cooler stars - lower energy - longer  $\lambda$ 's - redder color
- \* Stars are mostly whitish w/ tinges of color.



- Harvard Spectral Classification Scheme - grouping of stars by temp. & color into spectral classes



### II. Binary Star Systems and Stellar Mass

- Pairs of stars that orbit each other - accounting for about 50% of all stars in the universe.
- Orbital period and orbital distance depend on the gravity of the system, which is based on the mass of the stars.
- If stars are equally massed, center of mass (barycenter) will be half way between stars. Center of mass will be closer to larger massed star in unequal pair.

\* Fig. 3  
pg. 701  
Pearson

### III. Stellar Distance

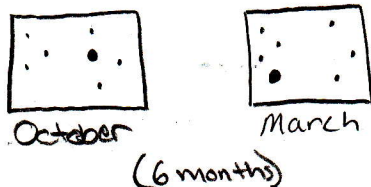
- Distance determinations are based on the parallax of stars.
- Parallax is the apparent shift of a star caused by Earth's revolution around the sun.
- Nearby stars have larger parallax measurements, distant stars have small parallax measurements.
- Parallax measurements are very small since stars are so far away.
  - Measured in arcseconds
    - width of your finger at arm's length =  $1^\circ$
    - $1^\circ = 60$  arc minutes; 1 arc minute = 60 arcseconds
    - Edge of paper = 30"; closest star's parallax is .76"!
- method is only good for stars within 100 parsecs - stars further than 100 parsecs have parallax too small to measure accurately.

- To calculate distance, use Parallax formula:

$$d = \frac{1}{P} \quad \begin{array}{l} d = \text{distance in parsecs (pc)} \\ P = \text{Parallax in arcseconds (")} \end{array}$$

- Parsec is a very large unit of distance
  - 1 parsec = 3.26 Light years (19 trillion miles)

Fig. 4  
Pg. 702  
Pearson



#### IV. Stellar Brightness

##### A. Apparent Magnitude

- The brightness of a star as it appears from (E).
- Measured or ranked on a number line from 1-6
- First magnitude stars are brightest, sixth mag. stars are dimmest (limit of naked eye).
- Each change in magnitude is a change in brightness by 2.5.
- App. mag. depends on: Size, temperature, and distance from (E).
- Brightness  $\propto \frac{1}{d^2}$  (inverse square law)

##### B. Absolute Magnitude

- How bright the star actually is.
- Sometimes referred to as luminosity
- The brightness of a star if it were 10 parsecs away from (E).
- A star's distance must be known to calculate its absolute mag.

\* Devised  
by Hipparchus  
~ 120 B.C.  
(850 stars  
ranked)

\* Table 1  
Pg. 703  
(Pearson)